Gyrokinetic Simulations of Kinetic-MHD Processes in Fusion Plasmas

Zhihong Lin
Fusion Simulation Center, Peking University and University of California, Irvine

Confinement and stability properties of fusion plasmas depend on cross-scale interaction of multiple physical processes such as microturbulence, energetic particle instabilities, magnetohydrodynamic (MHD) modes etc. I will summarize the status of first-principles simulation of these kinetic-MHD processes using the gyrokinetic particle code as an integrated simulation model for developing the predictive capability, and highlight recent progress in the verification and validation of the simulation model and in the studies of nonlinear wave-particle interactions underlying the transport processes.